ECONOMIC VIABILITY OF ENERGY CROPS IN THE EU

A CASE OF SWEET SORGHUM

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Carbohydrate crops and the dilemma of using them for non-food purposes

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Economic viability of crops

- Achieved if the return on investment realised is competitive with other job or investment opportunities which are open to the farmer at the present time and in the near future.
- i.e.

(a) Economic benefit

(b) Sustained into the future

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Economic Viability is more than profit ..

- *Profitability*
  - Now and in the foreseeable future
- Sufficiently *secured high returns* to the use of scarce resources tied to the project
- The resources used should be in general *non-exhaustible.* (Sustainability)
- No systematic damage to the *Environment*

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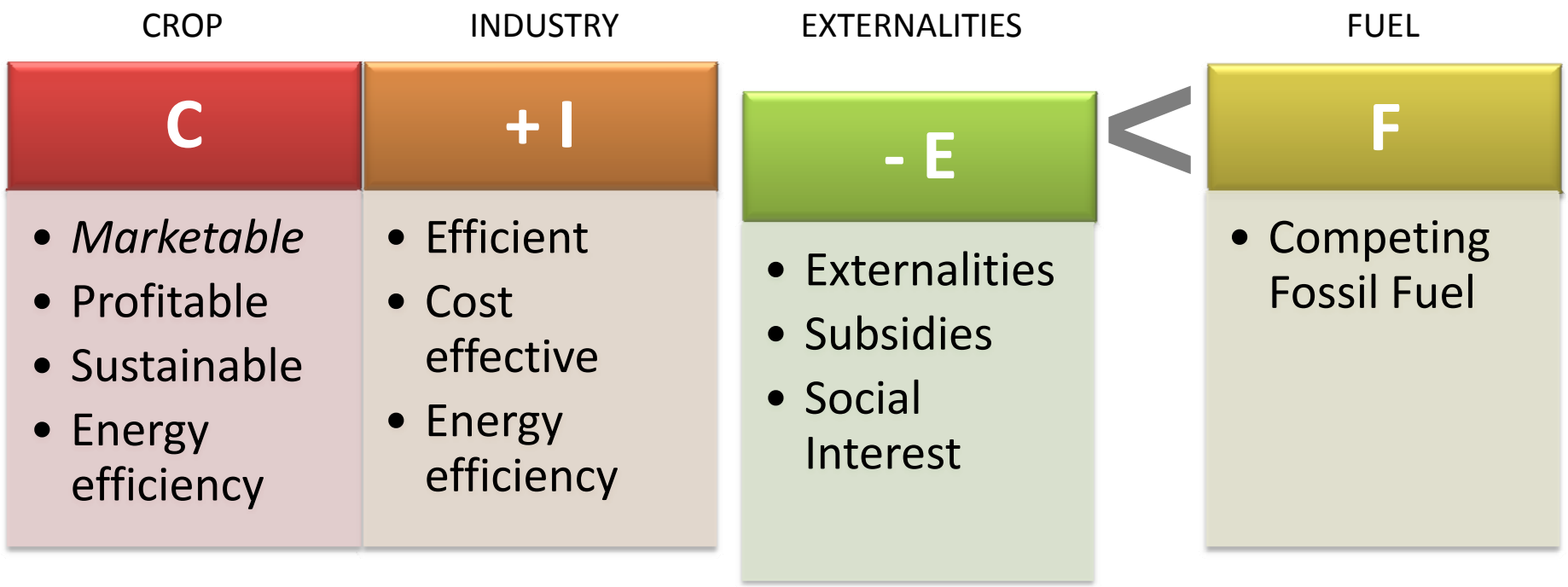
The point of view of the *farmer*

Economic Viability of Energy Crops

CHAIN INTERDEPENDENCIES



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Methodological Approach

Step	ACTION
1	Estimate RETURN on farmer's Land from current use =(opportunity) COST OF LAND
2	*Annuitise* the INVESTMENT COST of the proposed Project
3	Estimate annual *paid and imputed* RECURRING COSTS over the lifetime of the proposed Project
4	Identify *selling prices* of the new product(s) and estimate average expected RETURNS and or NET RETURN to FARMER's LAND
5	Compare results with possible ALTERNATIVE USE OF LAND (Preferential use of land)

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Beyond Accounting

Step	ACTION
1	SUBSIDIES are welcome but uncertain items. Add them at the END.
2	SUSTAINABILITY is important to viability. It relates to the use of scarce resources and the damage to the Environment
3	RISK relates to the size of the investment and the (in)flexibility to change
4	Crop ROTATION can be incorporated in the calculations by examining a full rotation cycle.
5	Competition between FOOD and NON-FOOD uses of land
6	SENSITIVITY ANALYSIS handles the uncertainty with regard to the magnitude of important parameters

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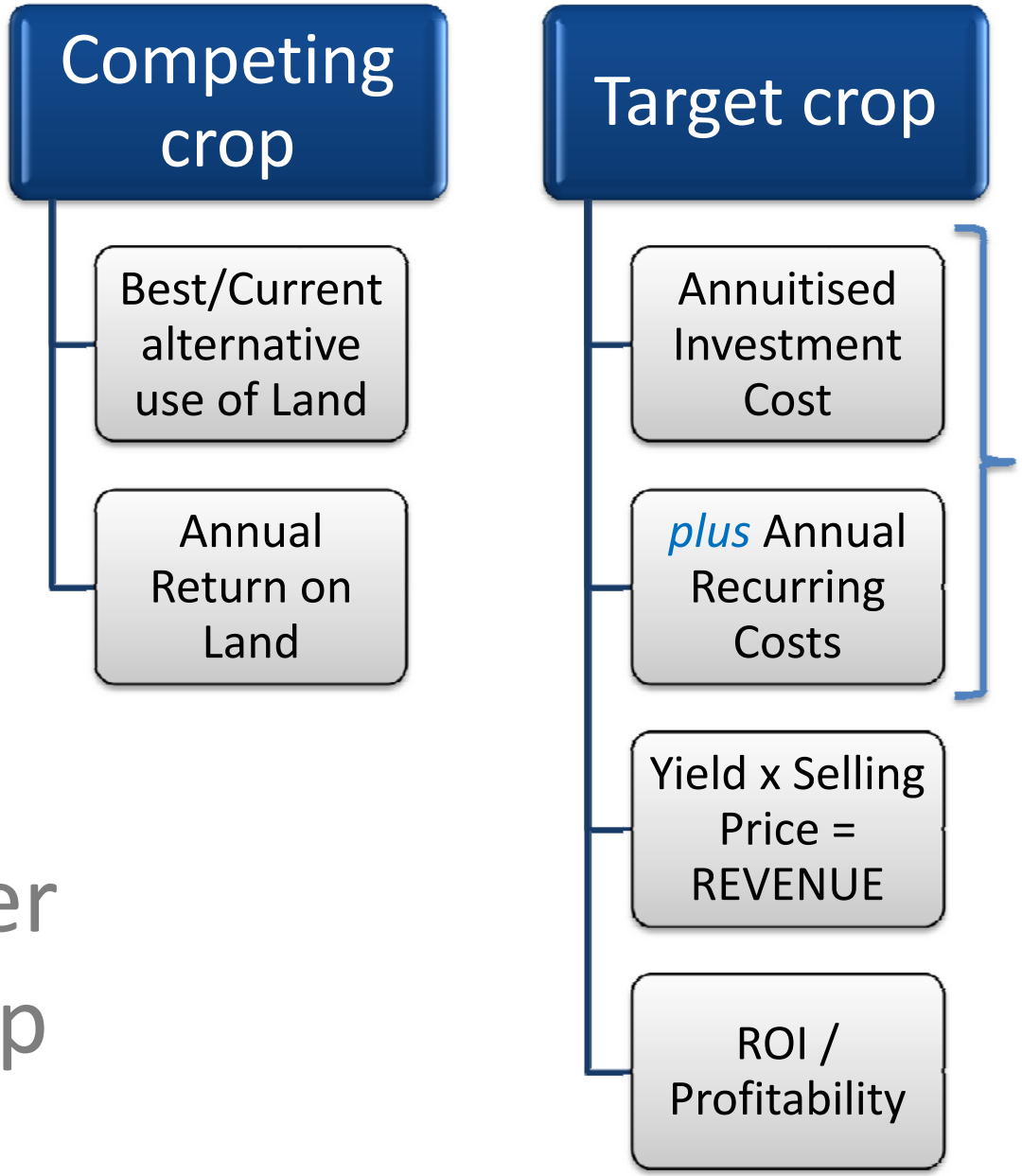
Financial Viability of target Crop assumes superiority over competing crop



Important points in Econ. Analysis

- High degree of uncertainty
  - Prices - fossil and renewable, political issues, CAP
  - Yields, e.g. experiment vs commercial,
- Exchange rates, Inflation
  - Monetary values, (Diff year, diff currency?)
- Averages are not best
  - Some are not useful, ..

BUILDING CASE STUDIES IS MORE MEANINGFUL

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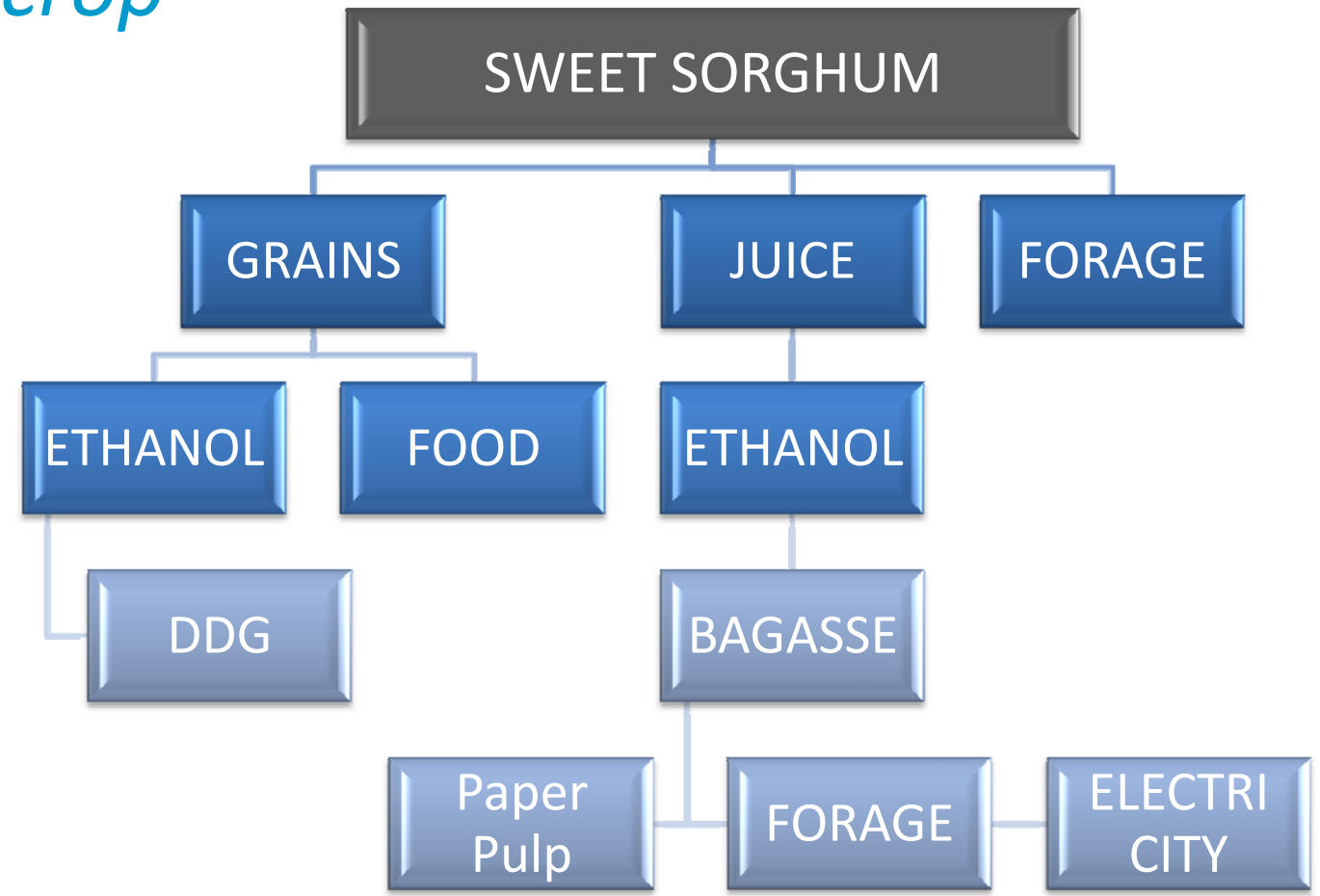
Sweet Sorghum:

*The 4**F** crop*



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Sweet Sorghum: pros & cons

- Can grow anywhere ±40^{o}
- Great yields
- Grain production= 5 t/ha
- Low needs for water, chemicals and energy
- Energy efficiency= 8x
- Ethanol output (l/ha/yr)= 4k -12k (sugarcane= 6k)

- Juice should be collected very soon after harvest
- Cannot be stored for long
- Sensitive to low temperatures

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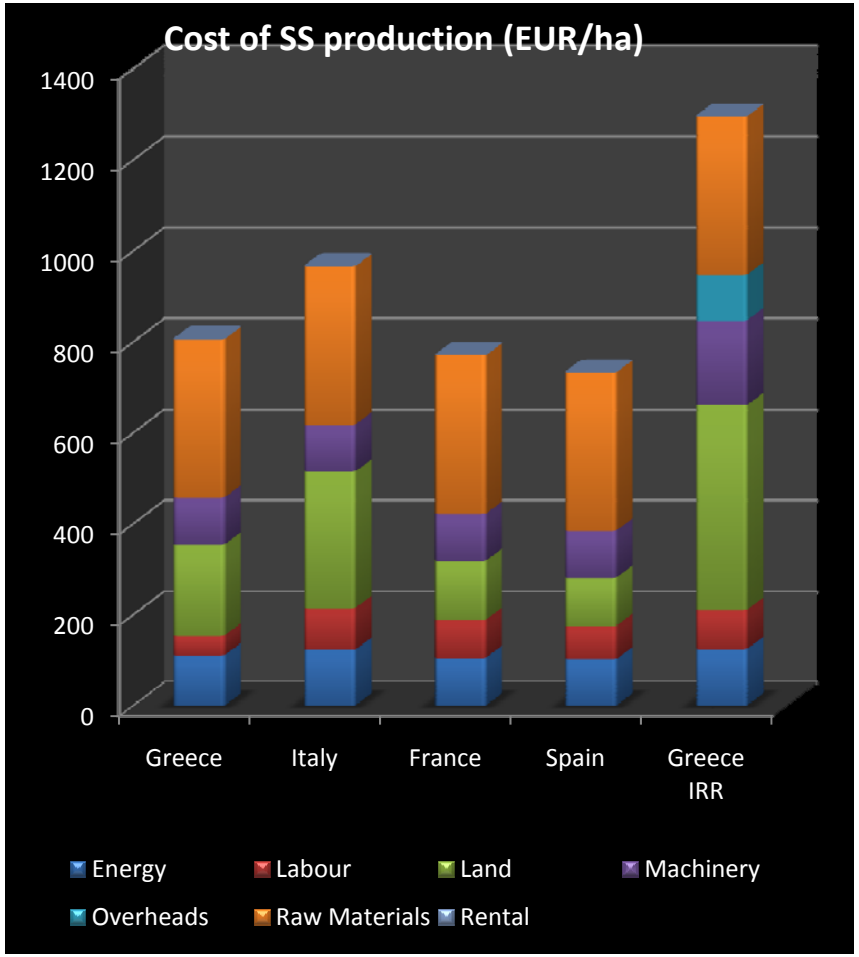
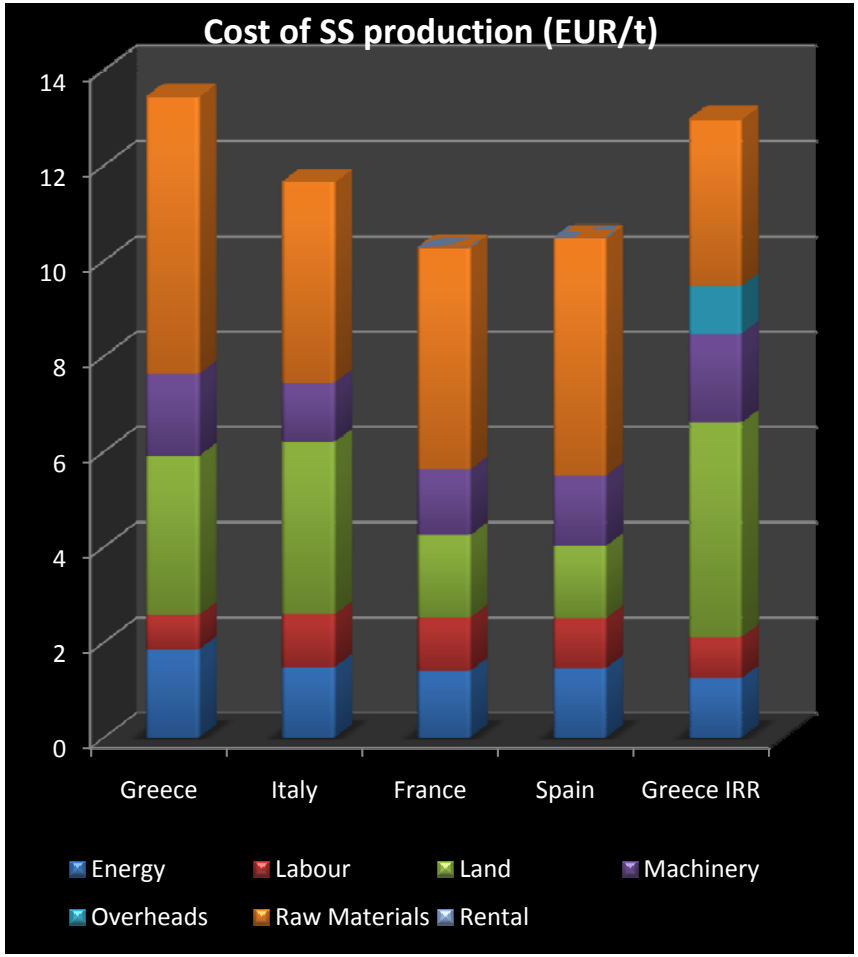
Sweet Sorghum selling price to ethanol plant estimated at 20-25 EUR/t (plus by-products)





ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION COSTS

S.Sorghum M.D.S. Spain N.I. Spain

Country/Region:	Spain	Annual yield:	70 ton/ha
Economic life:	1 yr	Avg Selling Price:	20 €

ESTABLISHMENT COSTS(€/ha)

Operations	Energy	Labour	Land	Machinery	Overheads	Raw Materials	Rented Services	Total
TOTAL								*0*

ANNUAL COSTS(€/ha)

Operations	Energy	Labour	Land	Machinery	Overheads	Raw Materials	Rented Services	Total
(Land Rent)			106					*106*
Fertilization	5.77	13.2		15.8		167		*201.77*
Harvesting	54.44	24		46.88				*125.32*
Sowing	10.81	4.8		11.65		100		*127.26*
Tillage	25.23	25.2		22.16				*72.59*
Weed-Pest Control	5.77	6		7		81		*99.77*
TOTAL	102.02	73.2	106	103.49		348		*732.71*
Created by ABC								
COST (EUR/t)	1.46	1.05	1.51	1.48	0.00	4.97	0.00	10.47

ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION COSTS

S.Sorghum Irr. M.D.N. Greece Irr. Greece

Country/Region:	Greece	Annual yield:	100 ton/ha					
Economic life:	1 yr	Avg Selling Price:	20 €					
ESTABLISHMENT COSTS(€/ha)								
Operations	**Energy**	**Labour**	**Land**	**Machinery**	**Overheads**	**Raw Materials**	**Rented Services**	**Total**
TOTAL								*0*
ANNUAL COSTS(€/ha)								
Operations	**Energy**	**Labour**	**Land**	**Machinery**	**Overheads**	**Raw Materials**	**Rented Services**	**Total**
(Land Rent)			450					*450*
(Overheads)					100			*100*
Fertilization	6.27	7.81		15.8		167		*196.88*
Harvesting	59.19	14.2		46.88				*120.27*
Irrigation	13.44	42.6		83.37				*139.41*
Sowing	11.76	2.84		11.65		100		*126.25*
Tillage	27.44	14.91		22.16				*64.51*
Weed-Pest Control	6.27	3.55		7		81		*97.82*
TOTAL	124.37	85.91	450	186.86	100	348		*1295.14*
Created by ABC								
COST (EUR/t)	1.24	0.86	4.50	1.87	1.00	3.48	0.00	12.95

ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION COSTS

Sugar Beet A.T.C. U.K. N.I. U.K.

Country/Region:	United Kingdom	Annual yield:	59.3 ton/ha					
Economic life:	1 yr	Avg Selling Price:	30.67 €					
ESTABLISHMENT COSTS(€/ha)								
Operations	**Energy**	**Labour**	**Land**	**Machinery**	**Overheads**	**Raw Materials**	**Rented Services**	**Total**
TOTAL								*0*
ANNUAL COSTS(€/ha)								
Operations	**Energy**	**Labour**	**Land**	**Machinery**	**Overheads**	**Raw Materials**	**Rented Services**	**Total**
(Land Rent)			175.8					*175.8*
Fertilization	7.34	13.24		15.8		207		*243.38*
Harvesting	71.39	36.12		79.88				*187.39*
Sowing	13.75	4.82		13.27		183		*214.84*
Tillage	32.09	45.75		40.85				*118.69*
Weed-Pest Control	7.34	6.02		7		200		*220.36*
TOTAL	131.91	105.95	175.8	156.8		590		*1160.46*
Created by ABC								
COST (EUR/t)	2.24	1.80	2.98	2.66	0.00	10.00	0.00	19.67